

## CLAIMS

1. A method for obtaining high performance and reduced emissions from an engine, the method comprising:
  - providing a high fixed intake and exhaust valve overlap selected to obtain high wide open throttle performance over the engine speed range,
  - 5 and reduced fuel consumption and NOx emissions through increased trapped exhaust residuals in part load operation;
  - equally varying the intake and exhaust valve timing to obtain superior full throttle performance over the speed range; and
  - deactivating operation of up to half of the engine cylinders during
  - 10 idle and low speed/load operation to provide increased load of the operating cylinders with resulting improved fuel efficiency and lower HC emissions.
2. A method as in claim 1 including starting the engine during deactivation of up to half of the cylinders.
3. An internal combustion engine comprising in combination:
  - a plurality of cylinders each having intake and exhaust valves and at least one camshaft timed to operate the valves with a high performance
  - fixed overlap;
  - 5 a cam phaser for each camshaft and controlled to equally vary the intake and exhaust valve timing for superior full throttle performance over the engine speed range; and
  - valve deactivation mechanism for up to half the cylinders and operative to deactivate the associated cylinders during idle and light load
  - 10 operation for increasing fuel efficiency and emission control and maintaining stable operation of the operating cylinders.

4. An engine as in claim 3 wherein the valve deactivation mechanism is operative during starting of the engine.

5. An engine as in claim 3 wherein the valves are actuated by at least one camshaft and each camshaft is controlled by a cam phaser operative to vary equally the timing of both intake and exhaust valves.

6. An engine as in claim 5 wherein a single camshaft actuates all intake and exhaust valves and the camshaft timing is controlled by a single cam phaser.